
Suisun Marsh Monitoring Program Channel Water Salinity Report

Reporting Period: March and April 2009

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1. SUISUN MARSH MONITORING STATIONS AND REPORTING REQUIREMENT

As per SWRCB Water Rights Decision 1641, dated December 29, 1999, and previous SWRCB decisions, the California Department of Water Resources (DWR) is required to provide monthly channel water salinity compliance reports for the Suisun Marsh to the SWRCB. Conditions of channel water salinity in the Suisun Marsh are determined by monitoring specific electrical conductivity, which is referred as "specific conductance" (SC). The locations of all listed stations are shown in Figure 8.

The monthly reports are submitted for October through May each year in accordance with SWRCB requirements. The reports are required to include salinity data from the stations listed below to ensure salinity standards are met to protect habitat for waterfowl in managed wetlands:

Station Identification	Station Name	General Location	Classification
C-2*	Collinsville	Western Delta	Compliance Station
S-64	National Steel	Eastern Suisun Marsh	Compliance Station
S-49	Beldon's Landing	North-Central Suisun Marsh	Compliance Station
S-42	Volanti	North-Western Suisun Marsh	Compliance Station
S-21	Sunrise	North-Western Suisun Marsh	Compliance Station

Data from the stations listed below are included in the monthly reports to provide information on salinity conditions in the western Suisun Marsh.

Station Identification	Station Name	General Location	Classification
S-97	Ibis	Western Suisun Marsh	Monitoring Station
S-35	Morrow Island	South-Western Suisun Marsh	Monitoring Station

Information on Delta outflow, area rainfall, and operation of the Suisun Marsh Salinity Control Gates are also included in the monthly reports to provide information on conditions that may affect channel water salinity in the Marsh.

* Throughout the report, the representative data from nearby USBR station is used in lieu of data from station C-2.

2. Monitoring Results

2.1 Channel Water Salinity Compliance

During the months of March and April, 2009, deficiency period applied thus two of the compliance stations (i.e. S21 and S42) salinity conditions were in compliance with channel water salinity standards of SWRCB (Table 1). The deficiency standards for the month of March and April was determined for each compliance station by comparing the progressive daily mean of high-tide SC with respective standards. The standards for compliance stations S-21 and S-42 were 15.6 mS/cm for March and 14.0 mS/cm for April. The progressive daily mean (PDM) is the monthly average of both daily high-tide SC values. The mathematical equation is shown below.

$$\text{PDM} = \frac{\sum \text{daily average of high tide SC}}{\text{\# days of the month}}$$

2.2 Delta Outflow

Outflow for March 2009 started off about 30,000 cfs as shown in Figure 5 and increased to a high for the month of about 52,000 cfs for a brief time in early March due to a series of precipitation events before quickly dropping off to about 8,000 cfs by mid-March. Thereafter, outflow remained stable and between 7,000 cfs and 10,000 cfs for the remainder of the month and a few days into April. By April 8, outflow had a slight increase above 10,000 cfs and remained that level throughout the month due to a few precipitation event that short lived. Overall the monthly outflow amount for both March and April are slightly higher compared to previous year. The monthly Delta outflow is represented by the mean Net Delta Outflow Index (NDOI). The NDOI is the estimated daily average of Delta outflow. Mean NDOI for March and April 2009 are listed below:

Month	Mean NDOI (cubic feet per second)
March	19,092
April	10,167

2.3 Rainfall

Rainfall events for March 2009 occurred mostly in early and a bit of activity at the later part of March as shown in Figure 5. In April, the amount and frequency was less than March, but the timeframe was also in the early part of the month. March monthly total was 2.39 inches and April total was 1.10 inches. The largest amount of daily rainfall that occurred in March and April were 0.94 inches and 0.83 inches, respectively. The monthly totals for both months are shown below:

Month	Total Rainfall (inches)
March	2.39
April	1.10

2.4 Suisun Marsh Salinity Control Gate (SMSCG) Operations

Operations and flashboard/boat lock installations at the SMSCG during March and April 2009 are summarized below.

Date	Gate status	Flashboards status	Boat Lock status
March 1 – April 30	3 gates held open	In	Open-24/7

Gate operation ceased since February 27, 2009 and continued to be non-operational during March and April 2009 due to low salinity levels in the marsh and meeting salinity standards for these two months were not of concern. However, the flashboards remained in place with boat lock gates open per agreement with NOAA.

3. Discussion

3.1 Factors Affecting Channel Water Salinity in the Suisun Marsh

Factors that affect channel water salinity levels in the Suisun Marsh include:

- delta outflow;
- tidal exchange;
- rainfall and local creek inflow;

- managed wetland operations; and,
- operation of the SMSCG and flashboard configurations.

3.2 Observations and Trends

3.2.1 Conditions during the Reporting Period

During March 2009 PDM salinity levels at Collinsville(C-2), National Steel(S-64), Beldons (S-49), Sunrise (S-21), and Volanti(S-42) were mostly stable and not higher than 3.0 mS/cm as shown in Figure 1. The largest ending PDM value for March was 3.0 mS/cm at Sunrise Club (S-21) and the lowest was 0.3 mS/cm at Collinsville (C-2). In April, there were more variability and slight increases of salinity patterns throughout the month at all stations but the amount of increases were so minimal that meeting the monthly salinity standard was not a bit concern. The largest ending PDM value for April was 5.4 mS/cm at Sunrise Club (S-21) and the lowest was 0.7 at Collinsville (C-2). At monitoring stations, S-97 and S-35, salinity levels in March dropped in early March due to creek runoffs as a result of precipitation events, and by mid-March S-97 began to increase slightly the remainder of the month, whereas S35 remained flat around 4.8 mS/cm probably due to runoffs from the Delta. In April, there were minimal rain activity and amount along with reduced outflow that both salinity patterns at S-97 and S-35 were the same but differ in magnitude.

Overall, salinity levels in March and April of 2009 were well below the monthly standards.

3.2.2 Comparison of Reporting Period Conditions with Previous Years

Monthly mean high-tide SC at the compliance and monitoring stations for March and April 2009 were compared with means for those months during the previous nine years (Figures 6 and 7).

Compared to previous nine years, March 2009 salinity levels and patterns were similar to that of 2008, but slightly lower in magnitude. In 2009, S49 salinity is higher than S42, whereas in previous year these two stations salinity levels of S49 was lower than S42. This could be the effect of operating the gates less this year compared to previous year, thus allowing more salinity intrusion further up to Beldons. March 2009 month was ranked third in high Specific Conductance, thus making it the month with the eighth lowest salinity levels.

Compared to previous nine years, April 2009 salinity levels and patterns were similar to that of 2008, but slightly lower in magnitude and S35 lower than S97. In 2009, S35 is lower than S97 is probably a result of higher outflow than previous years since S35 is driven more by outflow and S97 is driven more by creek runoffs, which was limited in April. April 2009 month was ranked third in high Specific Conductance, thus making it the month with eighth lowest salinity levels.

Table 1
Deficiency Period
Monthly Mean High Tide Specific Conductance at Suisun Marsh
Water Quality Compliance Stations

March 2009

Station	Specific Conductance (mS/cm)*	Standard	Standard meet?
C-2**	0.3	n/a	n/a
S-64	1.3	n/a	n/a
S-49	2.7	n/a	n/a
S-42***	2.6	15.6****	Yes
S-21***	3.0	15.6****	Yes

April 2009

Station	Specific Conductance (mS/cm)*	Standard	Standard meet?
C-2**	0.7	n/a	n/a
S-64	1.8	n/a	n/a
S-49	3.7	n/a	n/a
S-42****	n/a	14.0****	Yes
S-21***	5.4	14.0****	Yes

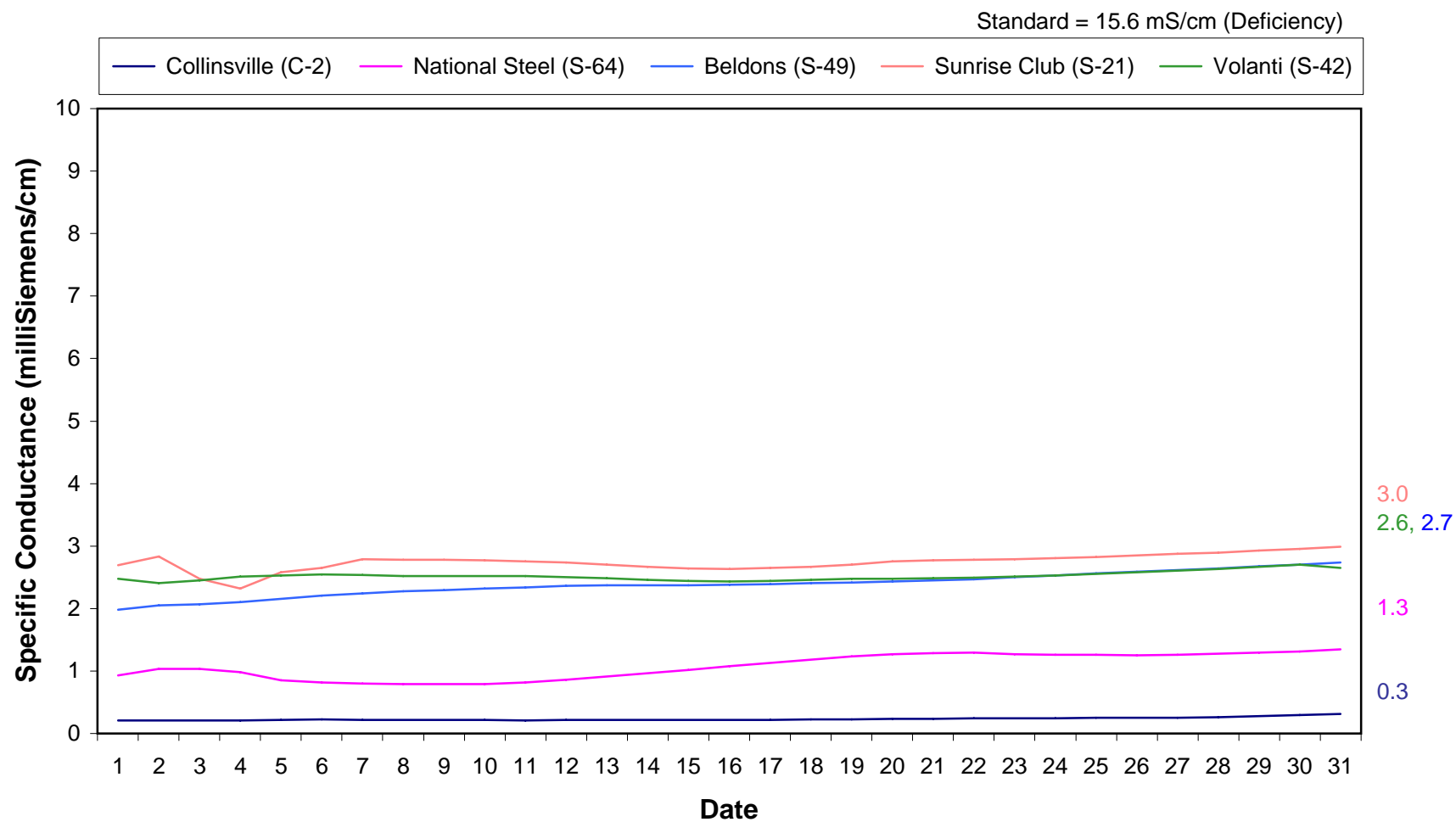
*milliSiemens per centimeter

**The representative data from nearby USBR station is used in lieu of data from station C-2.

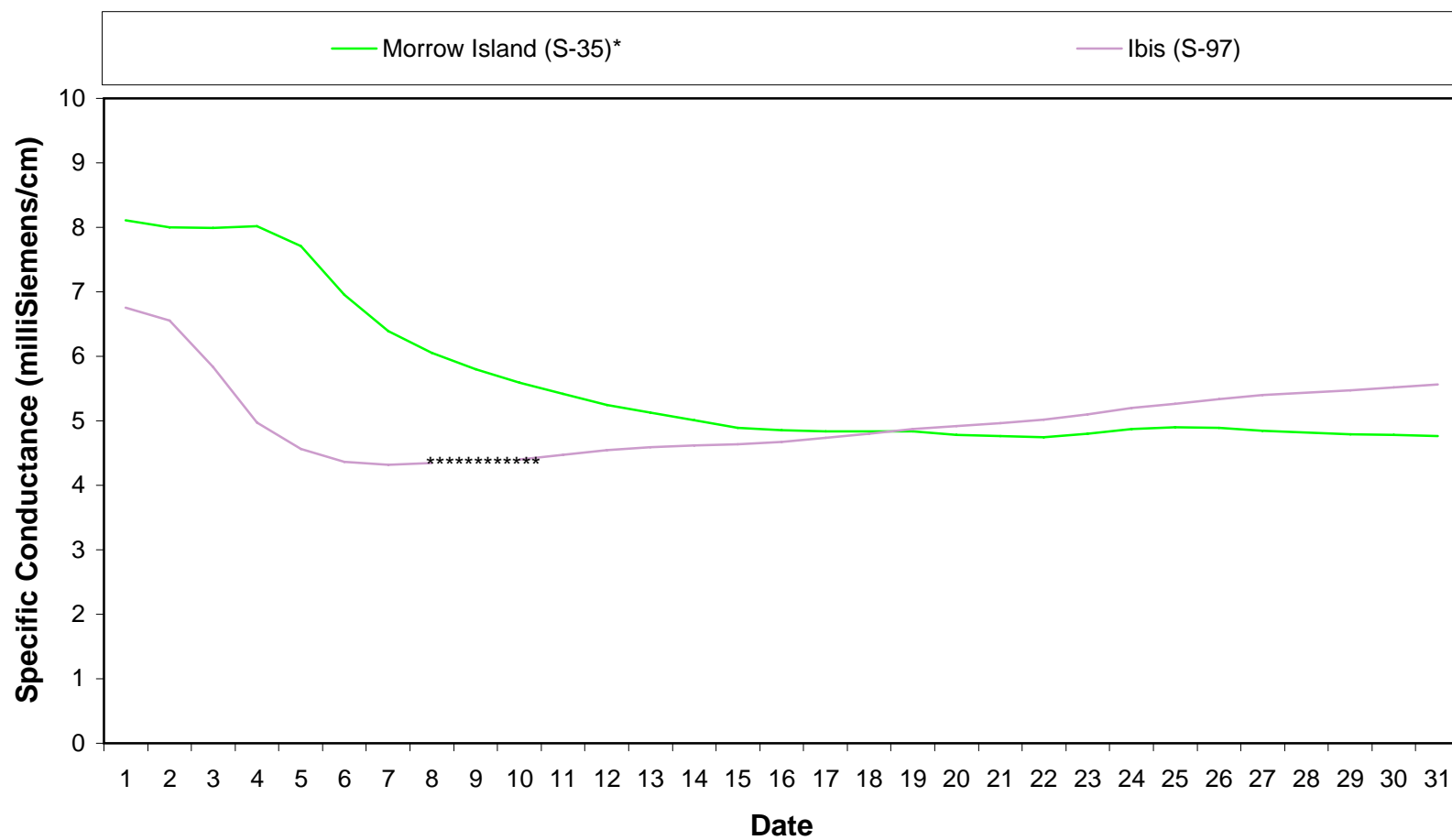
***S21 and S42 PDM calculation based on OCO MHT values which are taken on the hour interval.

****S42 had equipment failure for the entire month so no data recorded. S21 is a surrogate station since historically both S21 and S42 salinity levels are very similar, thus it's safe to conclude that salinity at S42 was met since S21 was met and was well below the monthly standard.

**Figure 1. Suisun Marsh Daily Mean High Tide Specific Conductance
March 2009**



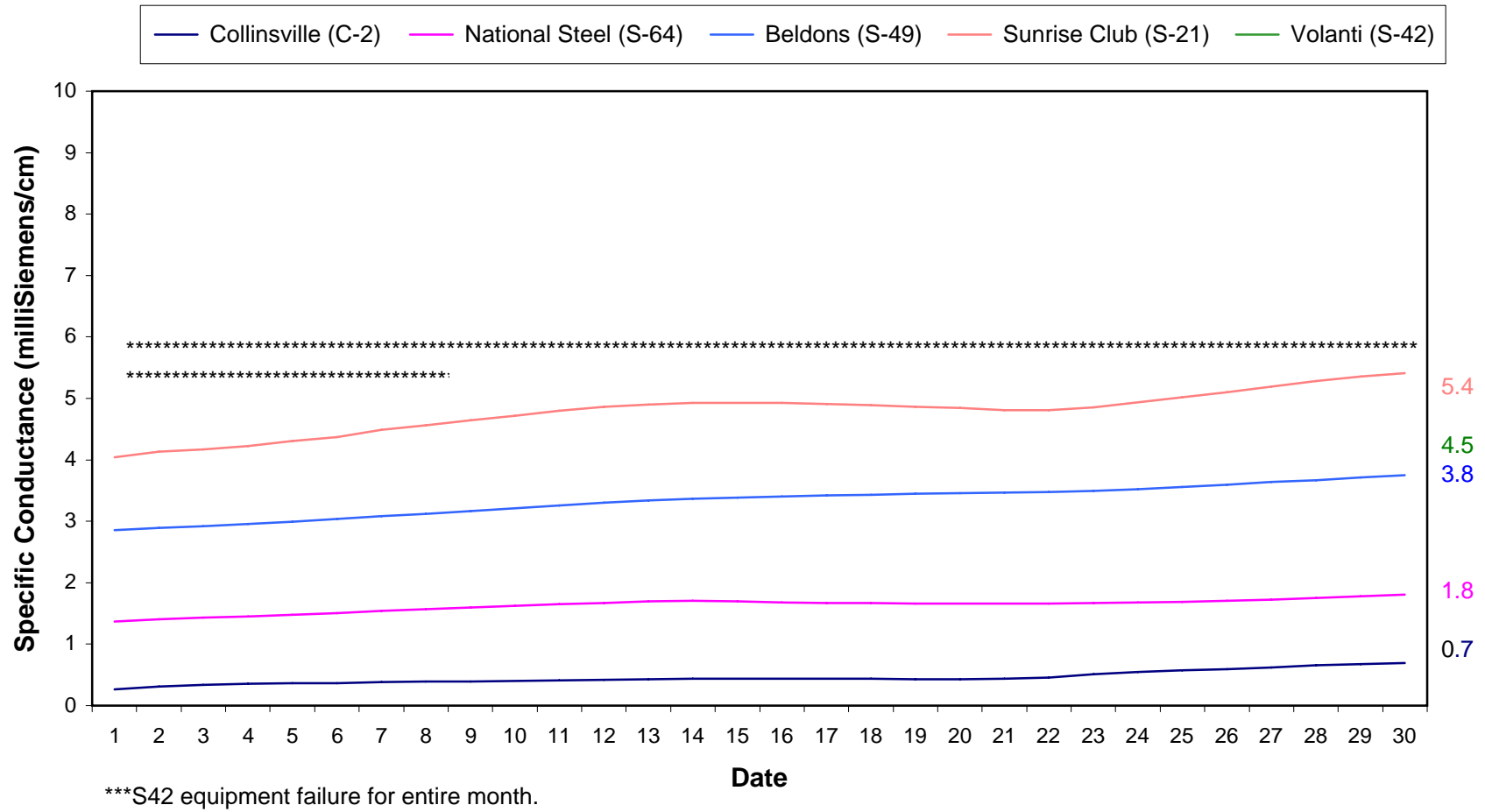
**Figure 2. Suisun Marsh Daily Mean High Tide Specific Conductance
March 2009**



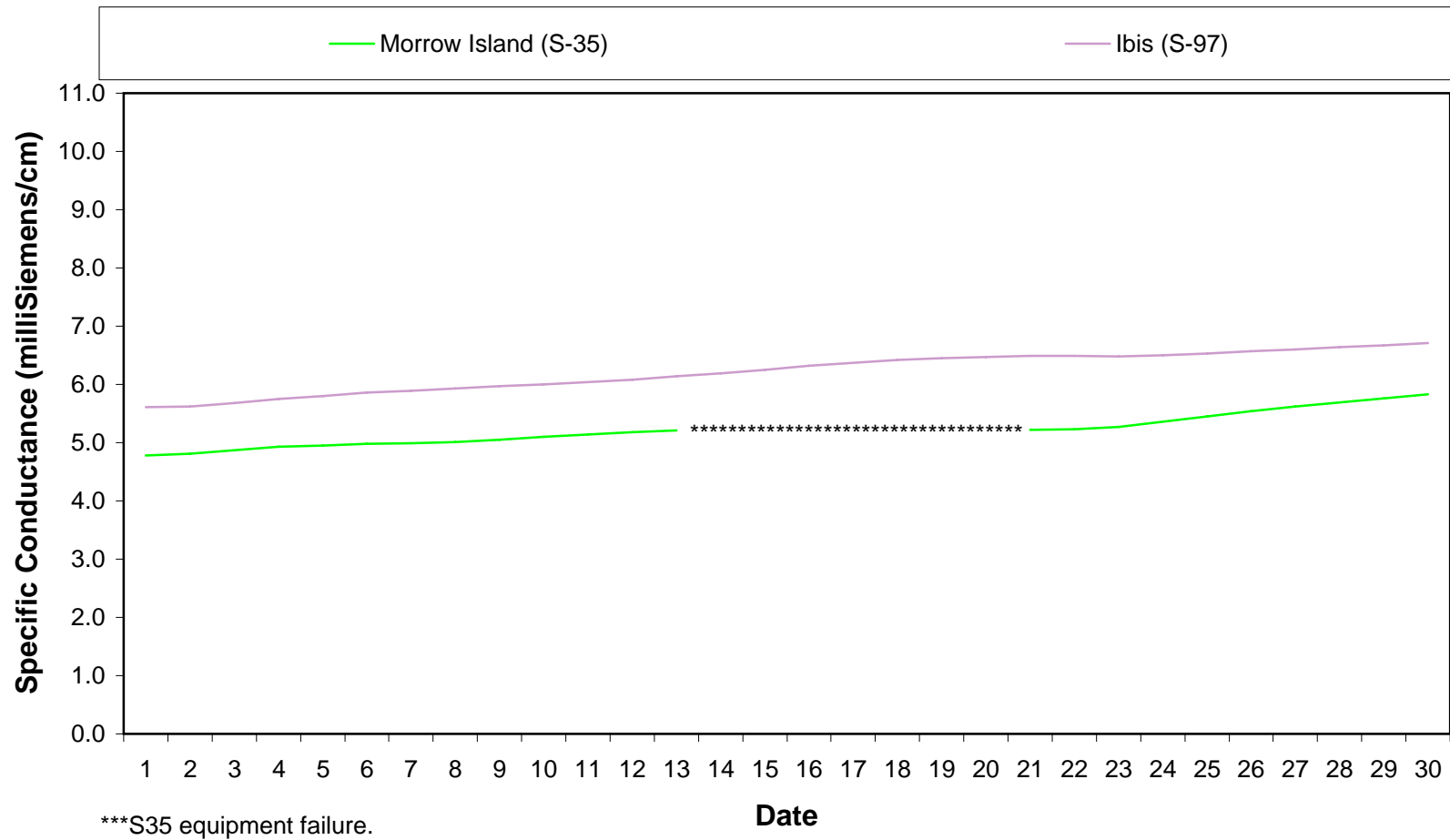
***** S97 equipment failure.

**Figure 3. Suisun Marsh Daily Mean High Tide Specific Conductance
April 2009**

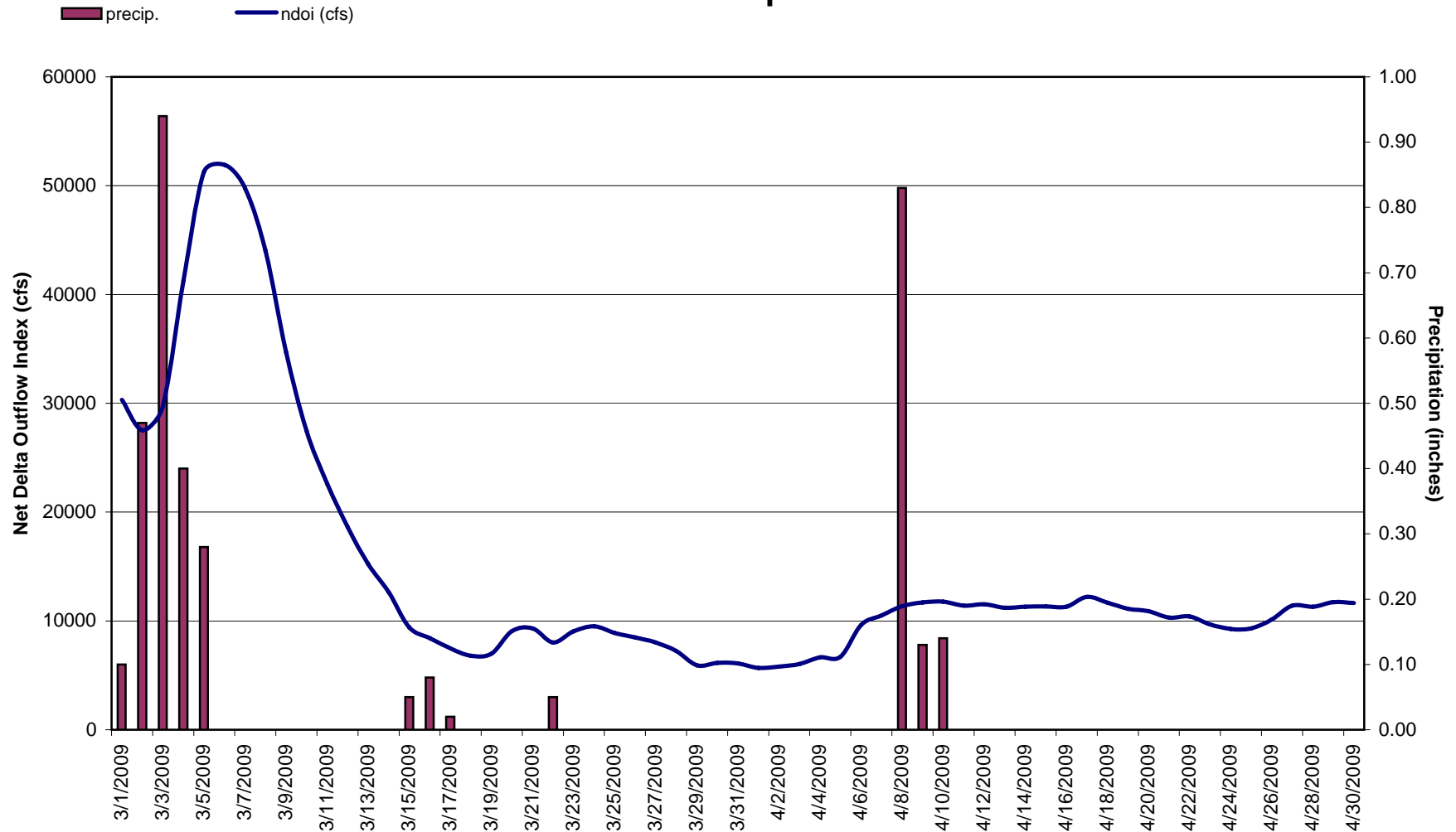
Standard = 14.0 (Deficiency)



**Figure 4. Suisun Marsh Daily Mean High Tide Specific Conductance
April 2009**

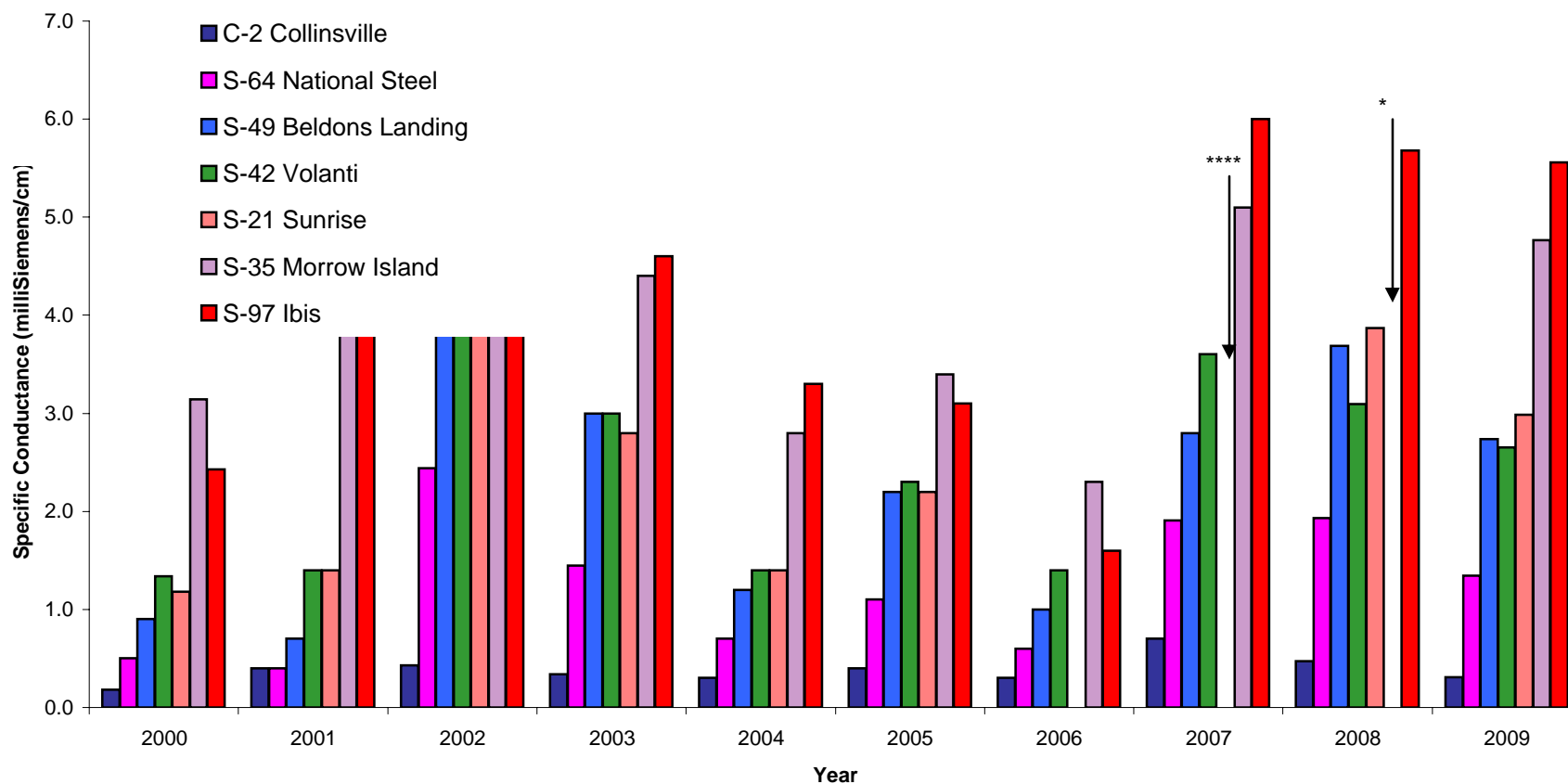


**Figure 5. Daily Net Delta Outflow Index and Precipitation*
March and April 2009**



*Preliminary DWR, O&M Delta Outflow data and precipitation from Fairfield Water Treatment Plant.

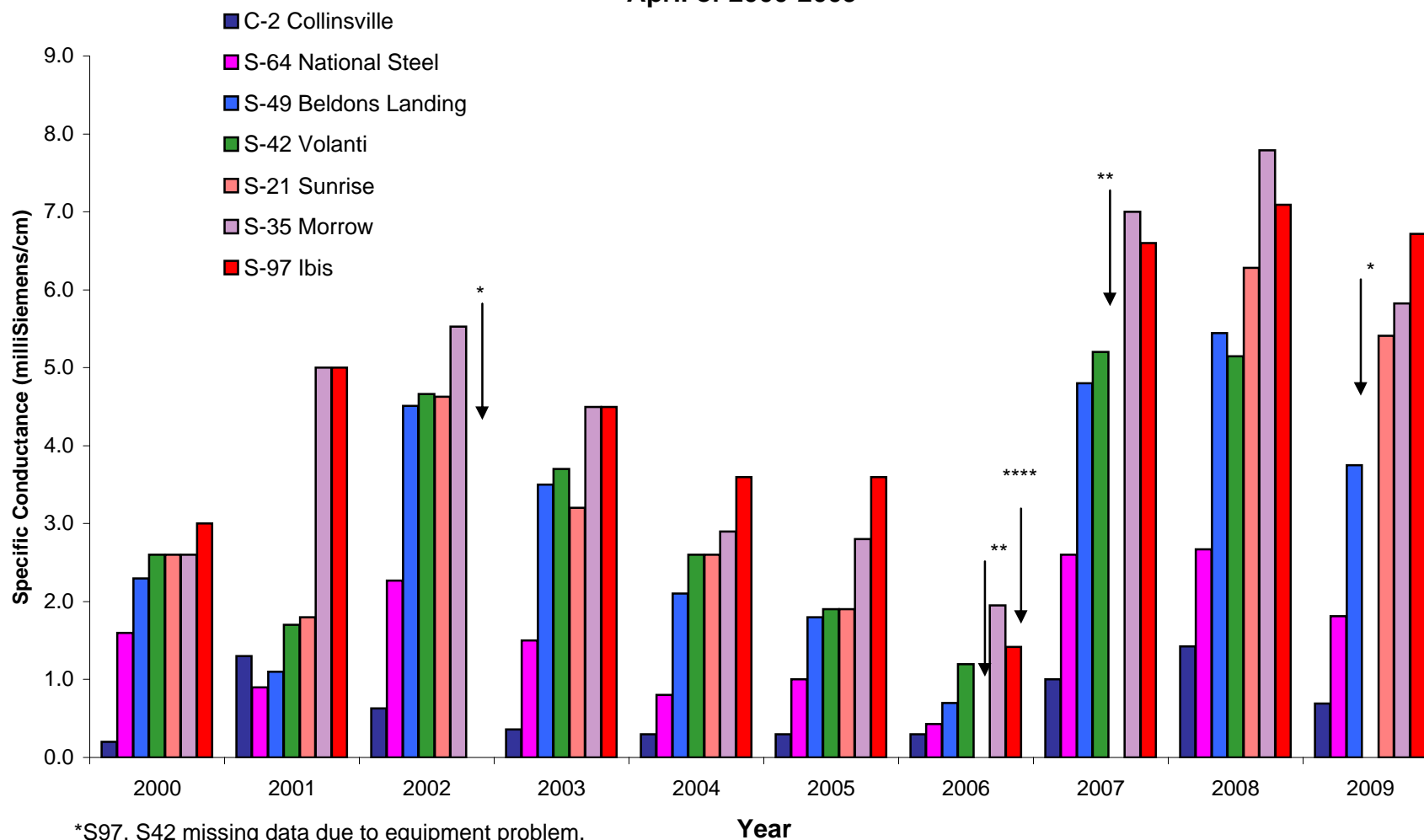
**Figure 6. Monthly Mean Specific Conductance at High Tide:
Comparison of Monthly Values for Selected Stations
March of 2000-2009**



****Data not available for S21 due to flooded roadways.

*Data not available for S35 due to equipment upgrade down time.

**Figure 7. Monthly Mean Specific Conductance at High Tide
Comparison of Monthly Values for Selected Stations
April of 2000-2009**



*S97, S42 missing data due to equipment problem.

**S21 data not available due to flooded roads.

****S97 data not representative of end of month value due to missing data within the month.

